OIPE JC10
MAY 15 2002
PATENT & TRADEMARK OFFICE

05-17-02

GP 2641

5-23-2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: N. Jayaratne
Appl. No.: 10/081,773
Filed: February 20, 2002
Docket No.: 1804
Title: ***A REAL TIME TRANSLATOR AND METHOD OF PERFORMING REAL TIME TRANSLATION OF A PLURALITY OF SPOKEN LANGUAGES***

Art Unit: 2641
Examiner:

Action: ***TRANSMITTAL OF CERTIFIED PRIORITY DOCUMENT***
Date: May 14, 2002

RECEIVED
MAY 21 2002
Technology Center 2600

TO: Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Pursuant to MPEP §201.14 enclosed is the certified copy of Provisional Australian Application No. PR 9569 to be made of record in the above-identified patent application.

If any questions remain to be addressed, it is respectfully requested that the undersigned attorney for the Applicants be contacted at the number listed below.

Respectfully submitted,

TIMOTHY J. MARTIN, P.C.

Timothy J. Martin, #28,640
Michael R. Henson, #39,222
Mark H. Weygandt, #43,260
9250 W. 5th Avenue, Suite 200
Lakewood, Colorado 80226
(303) 232-3388

OIPE JC10
MAY 15 2002
PATENT & TRADEMARK OFFICE

CERTIFICATE OF MAILING UNDER 37 C.F.R. 1.10

I hereby certify that the foregoing ***TRANSMITTAL OF CERTIFIED PRIORTY DOCUMENT*** is being deposited with the United States Postal Service as ***EXPRESS MAIL, LABEL NO.*** ET 203257434 US The Assistant Commissioner for Patents, Washington, D.C. 20231, on this 15th day of May, 2002.

Jacklyn K. Burns

Jacklyn K. Burns

RECEIVED
MAY 21 2002
Technology Center 2600

OIPE JC10
MAY 15 2002
PATENT & TRADEMARK OFFICE

AUSTRALIA

Patent Office
Canberra

RECEIVED
MAY 21 2002
Technology Center 2600

I, JONNE YABSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PR 9569 for a patent by NEVILLE JAYARATNE filed on 17 December 2001.

WITNESS my hand this
Twenty-fifth day of March 2002

J R Yabsley

JONNE YABSLEY
TEAM LEADER EXAMINATION
SUPPORT AND SALES

P/00/009 25.5.91
Regulation 3.2

AUSTRALIA

Patents Act 1990

PROVISIONAL SPECIFICATION

Invention Title: **REAL TIME TRANSLATOR**

The invention is described in the following statement:

Real Time Translator

This invention relates to a real time translator for providing multi language "spoken word" communication, conversation, and/or dialogue, conferencing and public address system. It is particularly related to a multilanguage conversation translator for the tourist, business or professional translation but is not limited to such use.

Background of the Invention

Arguably, the greatest ability the human race possesses is that of communication via sophisticated languages that have evolved over time. However, it is also the biggest barrier currently facing humankind. Even as the word "globalisation" is frequently used these days in the field of trade and business as well as many other areas of interaction between the different peoples of the world, the main "obstacle" to achieving true globalisation are language barriers. This limits the ability to communicate & converse one-on-one between people who converse through one of the many different languages.

- The tourist in a foreign country where he does not speak the language struggles to make himself understood for the most basic of requirements like asking for directions or making a purchase.
- The businessperson at the end of a telephone line trying to make conversation with either a potential client or business colleague in another country when he does not speak the language.
- The speaker wanting to address and communicate with an audience that speaks a different language in a conference or broadcast situation.

Summary of the invention

The aim of the invention is to provide an electronic solution to the language barrier between languages for the spoken word.

Broadly the invention provides a multilanguage conversation translator having dual voice paths operated by one or more sound cards and software so that conversation from one person in one spoken word language is translated and received by a second person in a second spoken word language at the same time or substantially at the same time as conversation from the second person in the second spoken word language is translated and received by the first person whereby the two persons can undertake a normal conversation in normal time but in different spoken word languages.

The translator can be portable or hand-held or be an earpiece or the like. Other versions of the system can be attached to the telephone system or attached to a personal address system or the like.

In accordance with the invention there is provided a real time translator comprising:

(a) a voice receiver;

(b) a voice to text converter;

(c) a text-to-text spoken language converter for receiving a first language and translating to a second selected language;

(d) a text to voice converter for converting the translated second selected language to a voice output; and

(e) a voice emitter for emitting the voice output.

In one form of the invention there is provided a real time translator comprising:

(a) at least one voice receiver;

(b) at least one voice to text converter;

(c) at least one text to text spoken language converter for receiving a first selected language text and translating to a second selected language text and/or for receiving the second selected language text and translating to the first selected language text;

(d) at least one text to voice converter for converting the translated first and/or second selected language to a voice output; and

(e) at least one voice emitter for emitting the voice outputs.

The real time translator could include two sound paths formed by two separate electronic sound manipulators with associated software such that the sound of the first voice in first language being received can be converted to text while the translated text into the second selected language is being converted to voice by the second separate electronic sound manipulator with associated software. The separate electronic sound manipulators may be two PC sound cards or the like, or two separate left and right channels of a single PC sound card or the like with separate software control.

In a particular preferred form of the invention there is provided a portable real time translator comprising

(a) first and second voice receivers for receiving first and second selected voice languages;

(b) first and second voice to text converters;

(c) at least one text to text spoken language converter for receiving a first selected language text and translating to a second selected language text and/or for receiving the second selected language text and translating to the first selected language text;

(d) first and second voice converters for converting the translated first and second selected language to first and second voice outputs; and

(e) first and second voice emitters for emitting the voice outputs.

There is an "overlap" in the processing of conversion of first and second voice conversions to or from text and/or with text to text voice language translation such that the lag time between receiving voice and emitting translated voice is within a reasonable conversation period. Such period can be of the order of 2 seconds. Further to simulate conversation the voice translation and emission is in voice phrases substantially corresponding with voice phrasing of input voice such that a continual flow of spaced voice phrases simulates conversations. Generally, such voice phrases are a sentence or part of a sentence.

Still further there may be such "overlap" in processing such that a first voice in a first language is received and translated and emitting translated voice simultaneously or apparently simultaneously with receiving a second voice in a second language and translating and emitting second translated voice. This can be by separate processing paths including the separate PC sound cards or the like or separate channels on a sound card or the like or by a switching system for switching between two processing paths at a rate to maintain reasonable real time processing of both paths simultaneously.

The invention also provides a method of providing real time translation of voices. The method includes:

a) providing first and second voice receivers for receiving first and second selected voice languages;

(b) providing first and second voice emitters associated with the first and second voice receivers respectively for emitting voice outputs;

(c) converting said first and second selected voice languages from said first and second voice receivers to text;

(d) providing a text to text spoken language converter for receiving a first selected language text from said first voice receiver and translating to a second selected language text and/or for receiving the second selected language text and translating to the first selected language text;

(e) providing a voice converter for converting the translated first and second selected language to first and second voice outputs; and

(f) emitting said translated and converted first and second voice outputs.

There is parallel processing of the voice to text conversion and/or text translation and/or the text to voice conversion. Two sound cards or two channels operating separately on a sound card can provide the first and second voice receivers and first and second voice emitters. Processing of the voice to text conversion and/or text translation and/or the text to voice conversion is by a cpu or the like with software control of the sound card/s. The parallel processing can be by cpu parallel processing techniques or by software control switching. Therefore both paths are always operating both ways to provide conversation.

The software has to overcome the difficulty of a single sound card operating in most uses and generally overriding other sound cards if installed later. The software overcomes this predetermined intent and the unusual parallel operation of two sound cards whether that be true parallel operation or switching between a speed of a voice phrase of about 2 seconds to the megahertz switching of the cpu.

This invention provides a practical solution to enable:

(1) a conversation and/or dialogue (which is relatively immediate, instant and on-the-spot) between two persons or groups wishing to communicate by conversing in two different languages either face-to-face or over a telephone line (or similar); and

(2) a speaker to communicate by addressing an audience in a language that is different to that of the audience.

The invention and methodology of providing a practical solution to achieve the following is detailed as follows:

- Technical methodology behind the solution in diagrams, flowcharts and by description.
- The applications that comply with the three main scenarios of

- Person-to-person conversation and/or dialogue in 2 different languages at any one instance
- Person-to-person or party-to-party conversation and/or dialogue via a telephone line (or similar) in two different languages at any one instance.
- Person to many in a lecture, conferencing, or public addressing System from one language to a different language at any one instance.

that satisfies the following three specific scenarios.

(1) Enabling a face-to-face conversation or dialogue (type method of communication) between speakers of two different languages.

(2) Enabling a telephone (or similar remote) conversation or dialogue (type of communication) between speakers of two different languages.

(3) Enabling a one-to-many communication between a speaker and audience in two different languages.

The invention provides an innovative and practical solution to the above scenarios providing the ability to communicate (speak) in Language-A and be understood (heard) in Language-B – immediately, instantly and "on the spot". And the ability, in reverse to communication (reply back) in Language-B and be understood (heard) in Language-A. As in the first two scenarios the ability to have a real-time conversation / dialogue in two different Languages. In the third scenario the ability to communicate by "addressing" or "to inform" in one language but be understood (heard) in a different language.

In order that the invention may be more readily understood, an embodiment will be described by way of illustration only with reference to the drawings wherein:

Figure 1 is a flow chart of a real time translator in accordance with a first embodiment of the invention;

Figure 2 is a diagrammatic representation of a real time translator of Figure 1;

Figure 3 is a diagrammatic representation of a first use of a real time translator in accordance with the invention;

Figure 4 is a diagrammatic representation of a second use of a real time translator in accordance with the invention;

Figure 5 is a diagrammatic representation of a third use of a real time translator in accordance with the invention;

Referring to the drawings and particularly Figure 1 there is shown in accordance with the invention a real time translator having a voice receiver, a voice to text converter, a text-to-text spoken language converter for receiving a first language and translating to a second selected language, a text to voice converter for converting the translated second selected language to a voice output and a voice emitter for emitting the voice output.

There is parallel processing of the voice to text conversion and/or text translation and/or the text to voice conversion. The first and second voice receivers and first and second voice emitters are provided by two sound cards or two channels operating separately on a sound card. Processing of the voice to text conversion and/or text translation and/or the text to voice conversion is by a cpu or the like with software control of the sound card/s. The parallel processing can be by cpu parallel processing techniques or by software control switching.

The real time translator includes two sound paths formed by two separate electronic sound manipulators with associated software such that the sound of the first voice in first language being received can be converted to text while the translated text into the second selected language is being converted to voice by the second separate electronic sound manipulator with associated software. The separate electronic sound manipulators has two PC sound cards or the like, or two separate left and right channels of a single PC sound card or the like with separate software control.

There is an "overlap" in the processing of conversion of first and second voice conversions to or from text and/or with text to text voice language translation such that the lag time between receiving voice and emitting translated voice is within a reasonable conversation period. Such period can be of the order of 2 seconds. Further to simulate conversation the voice translation and emission is in voice phrases substantially corresponding with voice phrasing of input voice such that a continual flow of spaced voice phrases simulates conversations. Generally, such voice phrases are a sentence or part of a sentence.

Still further there is an "overlap" in processing such that a first voice in a first language is received and translated and emitting translated voice simultaneously or apparently simultaneously with receiving a second voice in a second language and translating and emitting second translated voice. This can be by separate processing paths including the separate PC sound cards or the like or separate channels on a sound card or the like or by a switching system for switching between two processing paths at a rate to maintain reasonable real time processing of both paths simultaneously.

Procedure – Step-1.

- When words are spoken into Microphone (1) it is made active and received as input.
- Words spoken in Language-A is received via Microphone (1) and converted to Text.
- Words of Language-A (in Text format) are then translated within Real time translator to Language-B (also in Text format).
- Real time translator then switches focus to Speaker (2) and, the Text from of the words of Language-B is then converted back to speech and "spoken out" through Speaker (2).

Procedure – Step-2.

- Words spoken in reply or any words spoken in Language-B is received via Microphone (2) and converted to Text.
- Words of Language-B (in Text format) are translated within real time translator to Language-A (also in Text format).
- Real time translator then switches focus to Speaker (1) and, the Text from the words of Language-A is then converted to speech and "spoken out" through Speaker (1).
- All of the above happens instantly, immediately and "on-the-spot." Enabling a real-time conversation/dialogue between two different languages.

The essence of the invention is to enable a conversation / dialogue between two different languages and as such the invention remains unchanged irrespective of the languages in which the conversation or dialogue is conducted in. From the beginning, conversation between the following languages will be the focus. These include English, Korean, French, Simplified Chinese, Traditional Chinese, Italian, German, Spanish, and Japanese.

The Technical Methodology behind invention named as "Real time translator Hardware + Software" is as follows:

Three (3) basic steps.

- Receive the input-source of the spoken word and/or sentence via a channel of input (eg input source-one) such as a microphone or via a telephone line and convert to written text.
- Translate the text from one language to another.
- Speak out the translated text converted back to speech via an output channel (output source-two) such as a speaker from a headphone, telephone, or other.

Step – 1 Receive Spoken Word or Sentence via an Input Source

(1) Real time translator Software is invoked based on input from one of the two Voice Input Sources and will receive the input-source of the "spoken word" and/or "sentence" via a channel of input such as a microphone or via a telephone line, spoken by Person-1 in Language A.

(2) As shown in the Hardware configuration as detailed below, the invention works based on

- TWO Sound Cards or
- through programming, that utilises the Operating system aspects of the "left & right" channel capability of a single Sound Card.

However, for the purpose of the prototype the two Sound Card, method has been used.

Via either of these two methods, the invention of Real time translator is based on receiving spoken words from Voice Input devices such as.

(1) From a microphone (of a headset or single microphone).

(2) From a telephone line.

(3) From a Conference or Public announcement/speaker System.

(3) The spoken word or sentence is then converted to TEXT.

For the prototype demonstration the software package used for this purpose was IBM's ViaVoice Software package, which is specifically marketed and sold by IBM for the development of Voice Recognition Applications such as this. However, any similar Voice Recognition software of which there are several on the market can be used or similar software can be written. But either way the overall (Real time translator) invention behind the entire process of Real time translator Software remains unchanged.

Step – 2 Translate the Text.

The input source of words/sentence that was received and converted to TEXT from Step-1 is then translated from one language to another.

Again, for the prototype demonstration the software package used for this purpose was IBM's Software Package of "Language Translator for Text." This software package is specifically marketed and sold by IBM for the development of Text translation Applications such as this. However, any similar Text translation software can be used of which there are several on the market or similar software can be written. However, either way the overall Real time translator invention behind the entire process of Real time translator Software remains unchanged.

Step – 3 Speak Out the Converted Text.

The final step is - Text-to-Speech. Once Real time translator completes the TEXT translation, the last step is to convert back to speech and "speak out" the TEXT in words of translated language.

Again, for the prototype demonstration the software package used for this purpose was the TTS Software Package by the Microsoft Corporation. This software package is specifically marketed and sold by Microsoft for the development of Text-To-Speech Applications such as this. However, any similar Text-To-Speech software can be used of which there are several on the market or similar software can be written. However, either way the overall Real time translator invention behind the entire process of Real time translator Software remains unchanged.

Person to Person Communication via Conversation / Dialogue:

(1) Person-1 talks to Person-2:

- Real time translator Hardware (Portable Hardware configured for Real time translator Software) – running Real time translator Software. Attached with Microphone/Speaker (via headset or other) to Sound Card-1.

Also attached to Sound Card-2 is another Microphone/Speaker (either free-standing or also via a headset)

Sound Card-1 and the corresponding Microphone & Speaker are used by Person-1.

Sound Card-2 and the corresponding Microphone & Speaker are for the benefit of Person-2.

- Person-1 speaks into Microphone attached to Sound Card-1 – those words (sentence) spoken in Language-A, are received by the Real time translator Software controlling input Microphone (1), plus the conversion to TEXT.
- Real time translator Software controls input from Microphone (1).

- Real time translator Software and Software controlled by it then translates the Language-A text to Language-B text.
- Real time translator Software switches control internally within Real time translator to Sound Card-2,
- The previously translated words by Real time translator of Language-B are then converted to speech and "spoken out-loud" and are heard by Person-2 through the Speaker attached to Sound Card-2.

(2) The reverse applies when Person-2 either replies or talks to Person-1:

- Sound Card-2 and the corresponding Microphone & Speaker are for the benefit of Person-2.
- Person-2 replies (or speaks) into Microphone attached to Sound Card-2 – those words spoken in Language-B are then received by the Real time translator Software controlling input from Microphone (2), plus the conversion to TEXT.
- Real time translator Software controls input from Microphone (2).
- Real time translator Software and Software controlled by it then translates the Language-B text to Language-A text.
- Real time translator Software switches control internally within Real time translator to Sound Card-1,
- The previously translated words by Real time translator of Language-A are then converted to speech and "spoken out-loud" and are heard by Person-2 through the Speaker attached to Sound Card-1.

Thus enabling a two-way conversation between Persons 1 & 2 speaking Languages A & B respectively. Each would speak to the other in their respective Language and hear back from the other, also in their own Language. It would be almost as if there was no difference of language. It would be a real-time one-on-one conversation face-to-face through the portability of Real time translator.

Person to Person Telephone Communication:

(1) Person-1 talks to Person-2 via the Telephone or similar telecommunication method:

- Real time translator Hardware (Portable PC configured for Real time translator Software) – running Real time translator Software. Attached with Microphone/Speaker (via headset or other) to Sound Card-1.

Sound Card-2 is attached to the normal, industry standard Voice Modem and the output from the Voice Modem is then connected to a normal, standard telephone socket. No special

connection is required at Person-2's location and s represented by a normal telephone acting as another Microphone/Speaker. Therefore:

Sound Card-1 and the corresponding Microphone & Speaker are used by Person-1

Sound Card-2 and the corresponding Microphone & Speaker (via telephone) are used by Person-2.

- Dialling of the telephone number is done by Person-1 using the Voice Modem and when a connection is made.
- Person-1 speaks into Microphone attached to Sound Card-1 – and those words of Language-A is received by the Real time translator Software controlling input Microphone (1), plus the conversion to TEXT.
- Real time translator Software controls input from Microphone (1).
- Real time translator Software and Software controlled by it then translates the Language-A text to Language-B text.
- Real time translator Software switches control internally within Real time translator to Sound Card-2.
- The translated words of Language-B are converted to speech and "spoken out-loud" through the telephone line, which, is attached to the Sound Card-2 and is heard by Person-2 via the Speaker of the normal telephone handset. The telephone voice pulse/tone conversion is performed by the Voice Modem, as part of it normal functionality.

(2) Person-2 replies or talks to Person-1 via the same Telephone or similar telecommunication method:

- A reply or other words spoken by Person-2 in Language-B at the end of the Telephone line (or similar telecom device) is transmitted down the telephone line as normal and is input to Sound Card-2.
- Real time translator Software controls input from Microphone (2).
- Real time translator Software and Software controlled by it then translates the Language-B text to Language-A text.
- Real time translator Software switches control internally within Real time translator to Sound Card-1,

The translated words by Real time translator of Language-A are then switched to Sound Card-1, converted to speech and "spoken" and heard by Person-1 via the Speaker (headset or other) attached to Sound Card-1.

Thus enabling a two-way conversation between Persons 1 & 2 speaking Languages A & B respectively over a normal standard telephone line. Each would speak to the other in their

respective Language and hear back from the other in their own Language. It would be almost as if there was no difference of language. It would be a real-time one-on-one conversation face-to-face through the portability of Real time translator or via telephone by hooking it up to a telephone (as described below)

Use of the Voice-Modem:

The use of a normal standard Voice Modem to connect Real time translator Hardware (and thereby Software) is to provide a simple solution for the conversion between speech and standard telephone pulse/tone. It is also so that when used in different countries Voice Modems approved by the individual telecom authorities can be used easily and effectively instead of a specific built converter, which must then receive approval in each country.

Note:

As with the face-to-face scenario, when used over the telephone, Person-2 at the other end does not require Real time translator or any special device, as Real time translator on Person-1 performs all the work.

Person-1 to Many Persons – in a speaker- to-audience or public address scenarios.

(1) Person-1 talks to many Persons (representing Person-2)

- Real time translator Hardware (Portable PC configured for Real time translator Software) – running Real time translator Software. Attach Microphone/Speaker (via headset or stand alone) to Sound Card-1.
- Attach Sound Card-2 another Microphone/Speaker (either free-standing or also via a headset) if audience participation required else to a loudspeaker or any other speaker/broadcast System.

Sound Card-1 and the corresponding Microphone & Speaker are used by Person-1 (the lecturer /speaker in the this instance.

Sound Card-2 and the corresponding Microphone & Speaker are for the benefit of Person(s)-2 – the audience in this scenario.

- Person-1 speaks into Microphone attached to Sound Card-1 – those words of Language-A are received by the Real time translator Software controlling input Microphone (1), plus the conversion to TEXT.
- Real time translator Software controls input from Microphone (1).
- Real time translator Software and Software controlled by it then translates the Language-A text to Language-B text.

- Real time translator Software switches control internally within Real time translator to Sound Card-2,
- The translated words by Real time translator of Language-B are then switched to Sound Card-2, converted to speech and "spoken out-loud" and are heard by the audience (Person-2) via the Loudspeaker/Speaker attached to Sound Card-2.

Summary:

The invention (of the Real time translator Software and Hardware) provide for an easy two-way conversation/ dialogue between two (2) different languages at a single instance.

- In a face-to-face conversation (through the portability of Real time translator).
- In a conversation conducted over a standard telephone or telecommunication.
- In a one to many dialogue, such as a speaker to audience situation.
- In a one to many situation such as Radio, Television broadcasts & Public announcements.
- In a many to many dialogue, such as over a conferencing system.

(1) Specific Hardware configuration for the Real time translator.

The special configuration requirement was to:

- To add two Sound Cards.
- The same effect can also be obtained by coding to utilise the "left & right" channel invention of the single Sound Card but for the prototype the two Sound Card, approach was taken.

(2) Prototype

An embodiment of the invention can be built to be portable and will be specially built to be as small as possible and therefore easily carried by a person.

Real time translator software effectively breaks down the barriers of language. Whether it be English to Chinese or German to Japanese the difference of language and the inability to speak and establish a dialogue with someone unable to understand your own and only speaking a different language is changed forever by Real time translator.

Real time translator is a companion and friend for the traveller and the tourist means and provides complete freedom. Travel freely and easily from country to country and to make themselves understood as well as to understand the spoken language – instantly and "on the spot", without requiring to study or know any language at all

Real time translator for the businessperson provides an effective means of communication. A weapon and tool that provides for easy communication over the phone without the expensive and

wasteful exercise of wasting time and money. No language barrier & the accompanying problems/frustrations, talk directly to clients, supplies and potential business.

Real time translator provides for an effective tool in mass communications, Education and Presentation scenarios when communication in a different language, as well as for government organizations requiring to deal with people speaking different languages.

NEVILLE JAYARATNE
By his Attorneys
PIPERS (Melb)

17 December, 2001

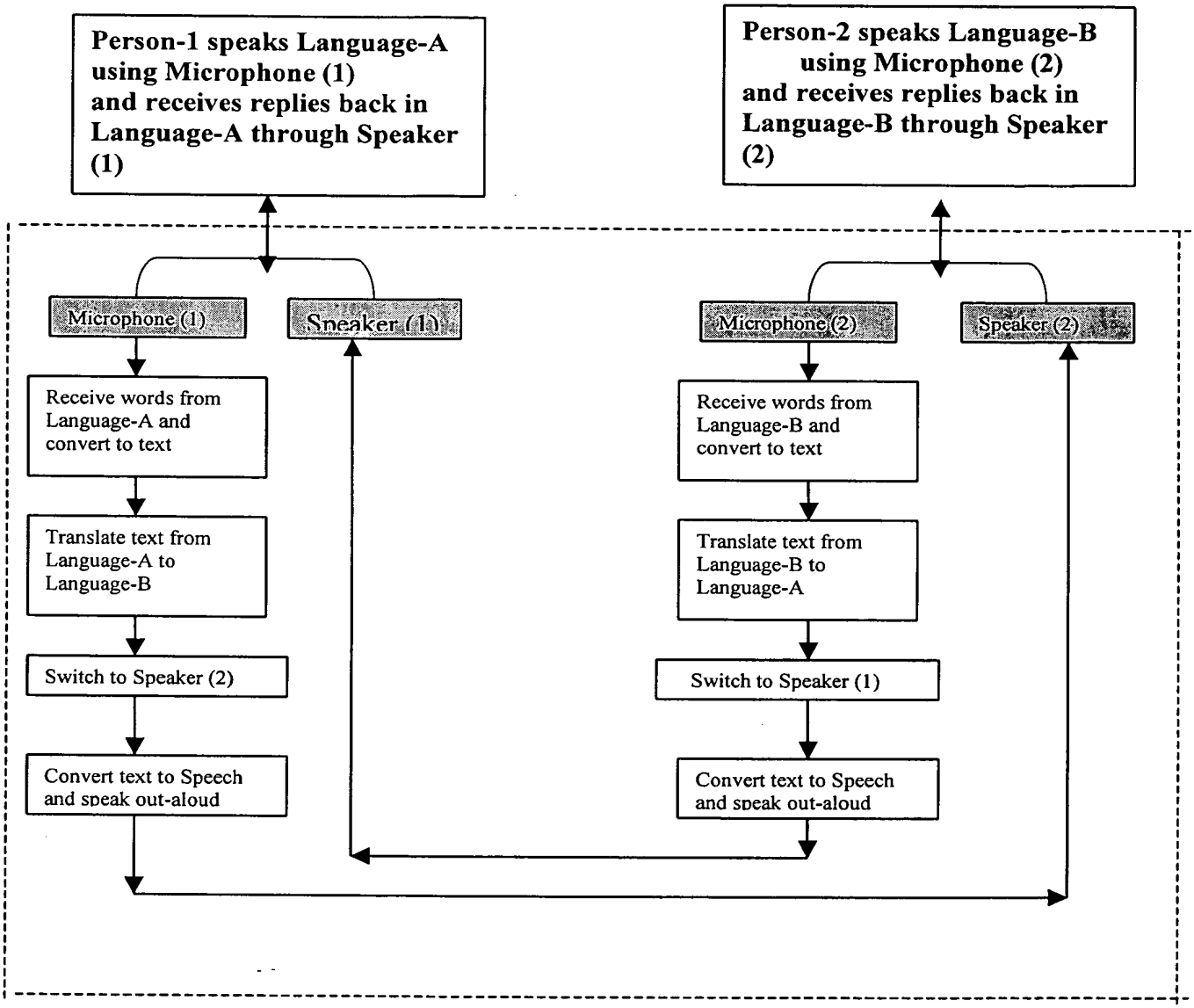
Person-1 speaks Language-A using Microphone (1) and receives replies back in Language-A through Speaker (1)
Person-2 speaks Language-B using Microphone (2) and receives replies back in Language-B through Speaker (2)
Microphone (1)
Speaker (1)
Microphone (2)
Speaker (2)
Receive words from Language-A and convert to text
Translate text from Language-A to Language-B
Switch to Speaker (2)
Convert text to Speech and speak out-aloud
Receive words from Language-B and convert to text
Translate text from Language-B to Language-A
Switch to Speaker (1)
Convert text to Speech and speak out-aloud

Figure 1

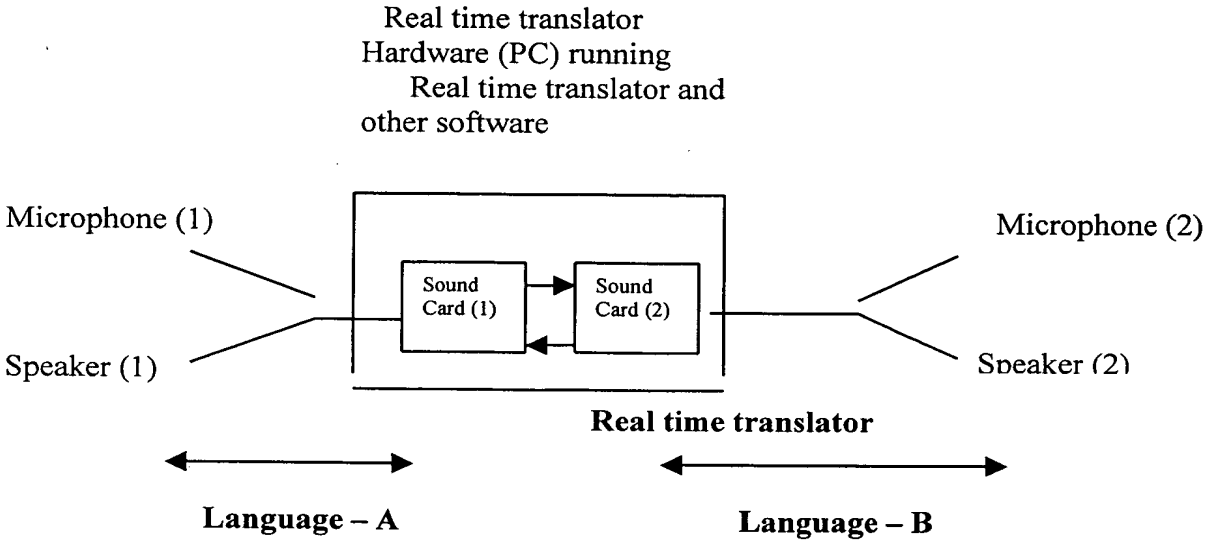
Real time translator
Hardware (PC) running
Real time translator and
other software
Microphone (1)
Speaker (1)
Sound
Card (1)
Sound
Card (2)
Microphone (2)
Speaker (2)
Real time translator
Language – A
Language – B

Figure 2

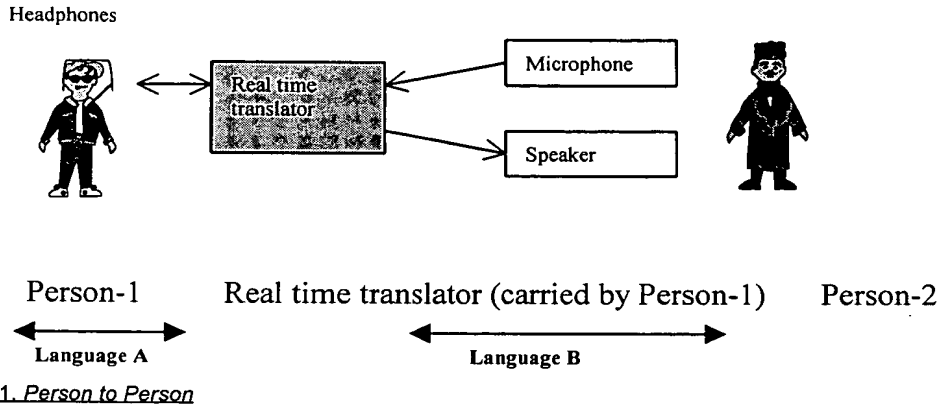

Figure 3

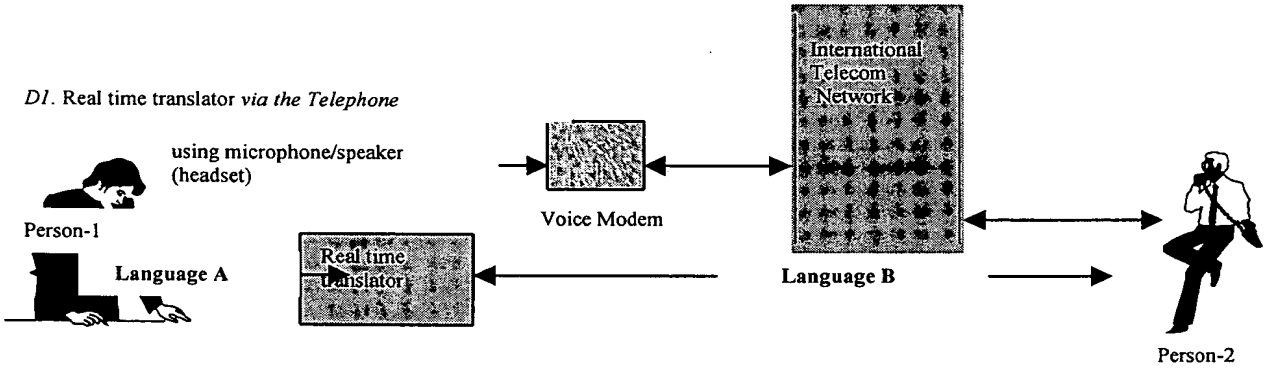

Figure 4

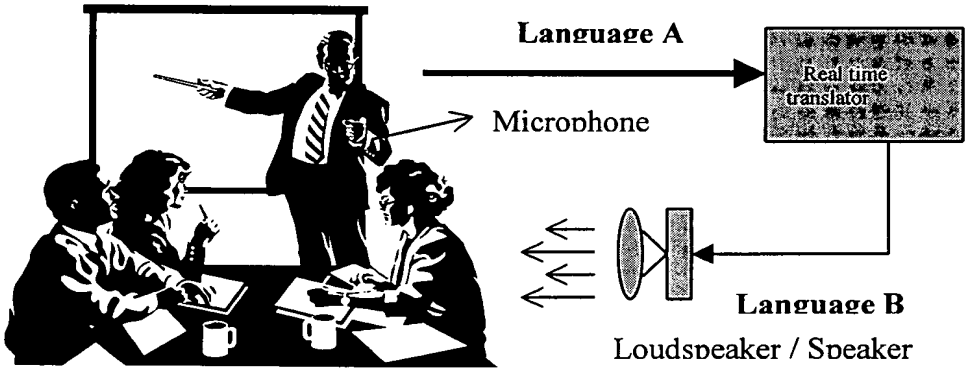

Figure 5